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THE MORE COMMON SPECIES OF PLANT-LICE THAT AFFECT THE APPLE, WITH SUGGESTIONS FOR THEIR CONTROL.

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This circular has been prepared to call the attention of apple growers to the more important species of plant-lice that may occur on the apple.

The Apple Leaf Aphis. (Aphis spp.)

When newly born, the apple leaf aphis is almost white, but soon becomes of a pale, dull, greenish, yellow color. The mature agamic females are generally without wings; their bodies are oval in form, about one-eighth of an inch in length, of a pale, yellowish color, often striped with deeper green. The eyes are black, and there is a short, tail-like appendage of a black color. On the back and near the posterior end of the body are a pair of tubes, through which the sweetish transparent fluid is excreted. This substance is known as "honey dew," and it is sometimes produced in such quantities as to form a glistening coating on the leaves and branches below the plant-lice. The winged females and males are very similar in color. The abdomen is short and thick, of an oval form, and bright, green color, with a row of black dots along each side; the wings are transparent with dark-brown veins. Figures I. and II. illustrate a winged male and wingless female respectively, highly magnified, showing the structure and shape of the insect.

Although formerly the apple leaf aphis was considered as a single species, taking different forms, according to recent investigations in Delaware, it has been found that there are three closely allied species affecting the foliage of the apple, differing slightly in their life histories, particularly as to time of appearance and migration, and also varying somewhat in the character of the injury inflicted. The effect of the

presence of two of the species results in a more curled condition of the infested leaves than in the case of the other.

Life History.

During the winter and spring there may often be found in the crevices and cracks of the bark or twigs of the apple tree, and also about the base of the buds, a number of minute, oval, shining black eggs. These are the eggs of the species of plant-lice to be mentioned. (See Plate I.)

Although there is a difference between the eggs of these different species, to the ordinary observer they are not distinguishable. These winter eggs are deposited in the fall and hatch at somewhat different times in the spring, according to the species. Prof. E. D. Sanderson gives the life history to be as follows: The eggs of Aphis fitchii hatch in this latitude, from about March 25th to April 25th, according to the season, the majority hatching during the first two weeks in April. The first generation becomes full grown in from seven to nine days. The

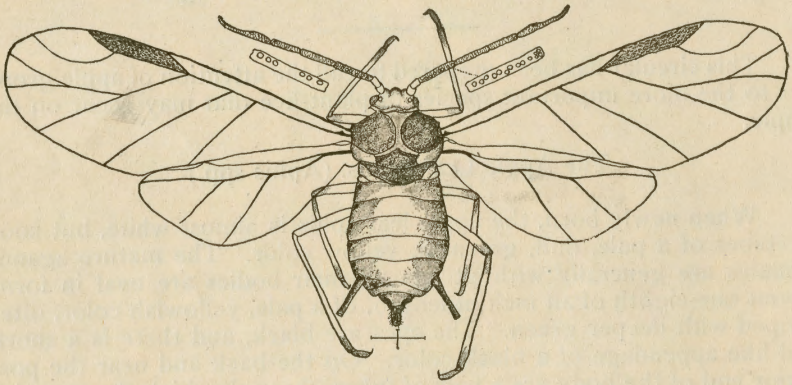
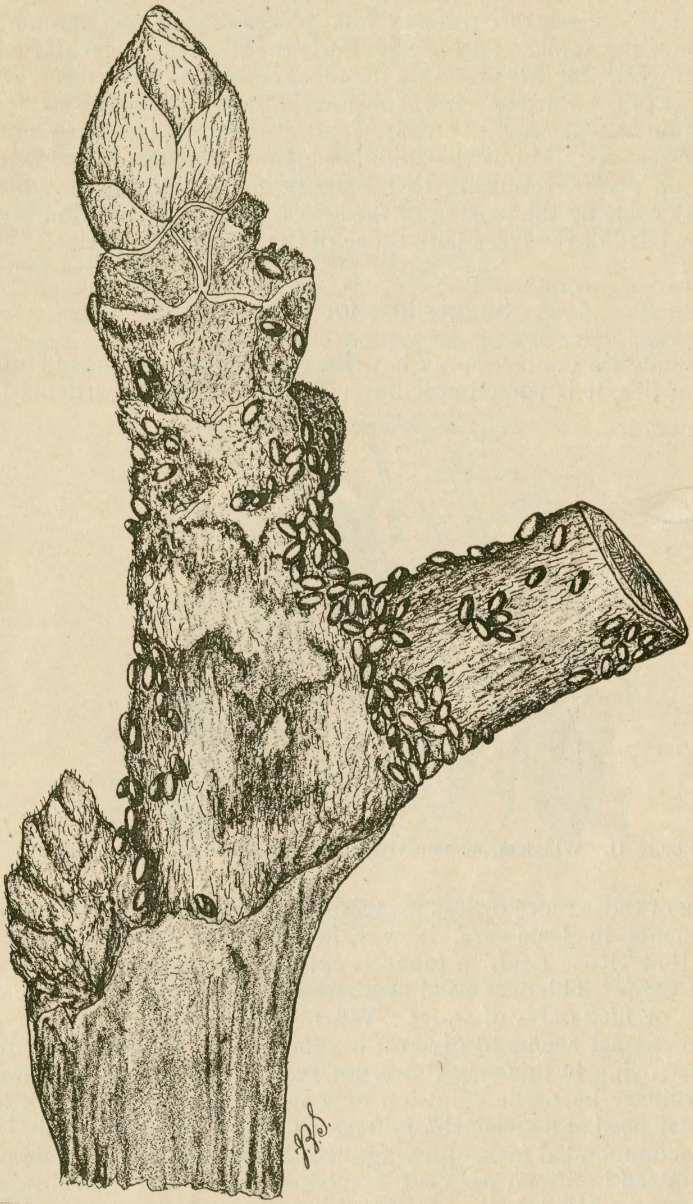


Figure I. Winged apple leaf aphis, much enlarged. (After Smith).

adults of the first generation are all apterous, viviparous females, and at once commence to give birth to living young at the rate of from three to six per day, for about a week. The second generation becomes grown in about ten days after birth, and the adults of the second generation are almost entirely winged. These winged forms migrate from the apple during the latter part of May, and from then until about October first this species is not seen upon the apple. The winged adults migrate to other food plants, appearing again on the apple in the fall with both winged females and males, and viviparous females, and the eggs are soon deposited in the crevices on the tree. After having oviposited, the aphids die, leaving their eggs to perpetuate the species.

The life histories of the other two allied species are very much the same as above, except in the case of Aphis pomi, which usually does



Eggs of apple plant louse; very much enlarged. (After Smith).

not become very abundant until about the middle of May. Also this species does not migrate to other food plants during the summer, but remains on the apple. This species curls the leaves to a greater extent than A. fitchii, and it is probably the most common of the three.

Eggs of the third species, Aphis sorbi, hatch about the latter part of April or first of May. In 1901, Sanderson found the stem mothers on May second. About the middle of June, this insect migrates to other food plants, returning to the apple in the fall, and completing its yearly cycle by the pairing of the sexes, and the disposition of eggs upon the bark of the trees with those of the other two species.

Suggestions for Control.

Although a contact spray is primarily the only means of combating plant-lice, it is sometimes difficult to reach them, particularly in

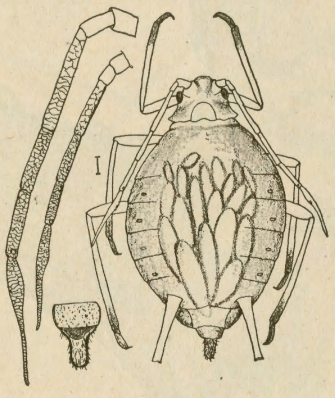


Figure II. Wingless, agamic viviparous apple aphis. (After Smith).

the case of those more or less protected by curled leaves. From recent experiments in Delaware, it was found, of the numerous mixtures tested, that "Rose Leaf," a tobacco extract, proved the most effective against them. This was used at a strength of one part of the extract to forty or fifty parts of water. When broken into a fine spray, this tobacco extract seems to give off a vapor which is destructive to the lice, destroying in this way those not actually hit by the mixture.

Ordinary kerosene emulsion or a mechanical mixture of coal oil and water used at a strength of fifteen to twenty per cent. of oil, is also to be recommended for a spray against these plant-lice. Crude petroleum, if used in fifteen per cent. emulsion, or the mechanical mixture, would prove to be equally effective.

Whale oil soap has also been recommended, but according to Prof. Earl, it was found to kill only from about two-thirds to three-fourths

of the lice, while it rather injured the foliage, when used at a strength of one pound to four gallons of water.

Thoroughness of application is always essential. It must be remembered that these insecticides act by clogging the spiricles of the lice, or by entering into the body through them. Unless the application is thorough, the insect may be weakened but not killed, or, if rendered helpless for a time, they may recover, and a second spraying thus becomes necessary, where one, more thoroughly applied, would have been sufficient. If the spraying be done in the spring as the lice are hatching, it will be comparatively easy to reach them, as they are clustered on the young, expanding leaves.

It is also a good policy to trim trees quite thoroughly in winter, on which there are many eggs, the cuttings, of course, to be promptly destroyed. Thus the number of individuals to start new infestation in the spring will be greatly reduced.

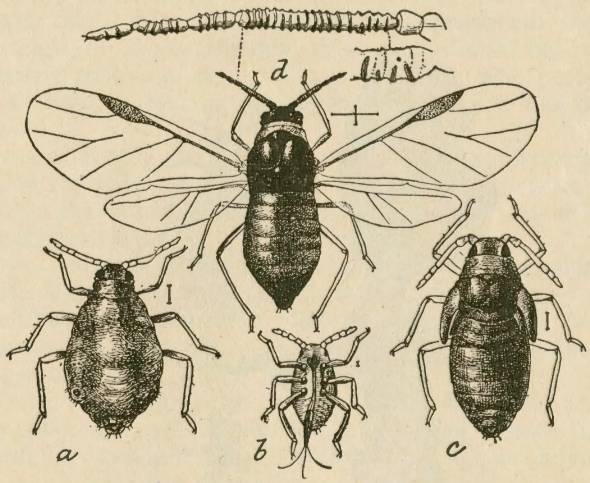


FIGURE III. The wooly aphis of the apple; agamic female; b, larva; c, pupa; d, winged female. (After Marlatt).

The Wooly Aphis of the Apple. (Schizoneura lanigera).

This insect causes injury in two ways. One form attacks the trunk and the branches of the apple tree, while the other lives under the ground upon the roots.

The presence of the aerial form of the wooly aphis on apple trees is readily detected by the bluish-white, cottony or downy substance that is excreted by and covers the greater part of each wingless individual aphis; and since these insects live in colonies, the patches of white matter are very conspicuous, and can scarcely escape the notice of the most casual observer. When present on the limbs, trunk and

branches, they cause an abnormal growth of the infested portion, resulting in the formation of a rough and pitted surface, and, at times, cause the death of the parts attacked.

The presence of the aphis on the roots is readily detected by removing the earth from the roots near the trunk of the infested tree. On the roots they produce wart-like swellings and excrescences varying much in shape and size. These deformities seriously diminish the normal supply of nourishment for the trees, and, if very numerous, induce gradual decay of the parts infested. Infested trees generally have a sickly and stunted appearance. The winged and wingless forms together with the character of its injury is illustrated in figures III. and IV.

Life History.

The solitary eggs of the wooly aphis may be found during the winter in the crevices of the bark at or near the base of the tree, where

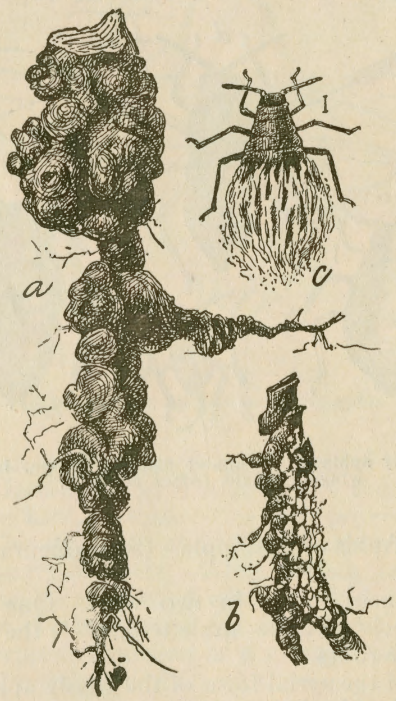


Figure IV. Illustrating the work of the wooly aphis of the apple on the roots; a, an apple root showing knots caused by the work of the insect; b, a colony of aphids on a root; c, a louse. (After Marlatt).

they are usually seen completely enveloped in the dead skin of the mother. In the spring these eggs hatch into wingless agamic females,

which in turn give birth to living young. This is continued during the summer, each generation being apterous agamic females only. Toward the latter part of summer, winged agamic females are developed. Some of the winged lice may leave the infested trees and fly to other trees, where they start colonies by bringing forth living young. Late in fall, toward the approach of cold weather, some of the agamic females bring forth living, wingless and mouthless true males and females. These pair, and the females each develop a single egg and perish.

Many times these lice will live over a mild winter, as the aphids themselves are usually able to hibernate in large numbers, and hence it is that we can find this species very often in midwinter on roots of trees, but they appear to feed very little, if at all, during the winter.

Suggestions for Control.

The lines of treatment recommended for the leaf aphids will be equally effective against the aerial form of the wooly aphis, but for the root form, other means of control must be practiced. As this pest is very troublesome to nurserymen, great care should be exercised in selecting young stock, to see that it is free from this pest, and that nothing is planted in the way of apple stock until it has been properly fumigated.

The grower should also be extremely careful in procuring young apple trees to see that the pest does not occur on either limbs or roots, as after the aphis becomes established in a soil, it is difficult to effect its eradication.

When occuring on orchard trees in the soil, the trenching around an infested tree and filling the trench with a liberal supply of ground tobacco, refilling the trench immediately after, will have the effect of clearing the roots of this pest. Unground tobacco stems, or coarse tobacco will not answer as it must be finely powdered.

It has also been found that salty mixtures kill plant-lice more or less rapidly; therefore, where root-lice are present, potash in the form of kainit, and nitrogen in the form of nitrate of soda, are advisable. Ten pounds of kainit to a five or six-year-old tree of good size would be sufficient, spreading the material on the surface evenly as far as the roots are likely to extend. As this insect does its worst injury on young apple trees, nurserymen as well as growers should be on the lookout for its first appearance.